

WHAT IS CLAIMED IS:

Claims 1-21 (Cancelled).

Please add the following claims:

22. (New) A method of etching an insulating layer in a wafer to present
5 a clean and fresh surface on the insulation layer for a deposition on the insulating layer,
including the steps of:
- providing a relatively strong electrical field at first positions in an
enclosure,
- providing a relatively weak electrical field at second positions displaced in
10 the enclosure from the first positions, the relatively weak electrical fields defining a
capacitor with a high impedance to limit the transfer of electrical charges to the insulating
layer in the wafer,
- passing molecules of an inert gas through the enclosure, and
- providing a magnetic field in the enclosure in a direction relative to the
15 strong electrical field to obtain a movement of electrons in the enclosure at the positions
of the strong electrical field and an ionization of molecules of the inert gas by the
electrons and a movement of the ions in a direction relative to the weak electrical field to
obtain a movement of the ions, in accordance with the high impedance of the capacitor
defined by the relatively weak field, to the second electrode at a speed for etching the
20 surface of the insulating layer on the wafer substantially uniformly without pitting the
insulating layer.

23. (New) A method as set forth in claim 22 wherein
the relatively strong electrical field is provided in a first direction and
the relatively weak electrical field is provided in a second direction
opposite to the first direction and wherein

5 the magnetic field is provided in a direction transverse to the first and
second directions to produce a movement of the electrons in the enclosure in a helical
path for facilitating the ionization of molecules of the inert gas in the enclosure.

24. (New) A method as set forth in claim 22
10 the wafer is disposed in the weak electrical field and wherein
the molecules of the inert gas are passed through the enclosure initially to
positions in the strong electrical field to obtain an ionization of molecules of the inert gas
and subsequently through the enclosure to positions in the weak electrical field to
facilitate an etching of the surface of the insulating layer on the wafer by the ions.

15 25. (New) A method as set forth in claim 22 wherein
the wafer is disposed in the relatively weak electrical field and wherein
an electrode providing the relatively weak field is spaced from, but
disposed relatively close to, the wafer to cooperate with the wafer in providing a high
20 impedance in the capacitor and a circuit including the capacitor for attracting the ions in

the weak electrical field to the wafer to etch the surface of the insulating layer on the wafer without pitting the insulating layer.

26. (New) A method as set forth in claim 21 wherein

5 the capacitor constitutes a first capacitor and wherein
the relatively weak electrical field is defined by the first capacitor and a
second capacitor in a series circuit and wherein

the first capacitor is defined by plates constituting an electrode and the
wafer and in which the plates are separated by a space in which molecules and ions of the
10 inert gas are disposed to define the insulator for the capacitor and to provide the first
capacitor with the high impedance and wherein

a second capacitor is defined by plates constituting the wafer and the ions
of the inert gas in the enclosure and wherein the plates are separated by the insulating
layer in the wafer to define the insulator of the second capacitor and to provide the
15 second capacitor with a relatively low impedance in comparison to the high impedance of
the first capacitor.

27. (New) A method as set forth in claim 26 wherein

the relatively strong electrical field is provided by a first electrode and a
20 first alternating voltage providing a relatively high negative bias on the first electrode and
wherein

the relatively weak electrical field is provided by a second electrode and by a second alternating voltage providing a relatively low bias on the second electrode.

28. (New) A method as set forth in claim 26 wherein
5 the wafer is disposed in the weak electrical field and wherein
the molecules of the inert gas are passed through the enclosure initially
through positions in the strong electrical field to obtain an ionization of molecules of the
inert gas and subsequently through positions in the weak electrical field to facilitate an
etching of the surface of the insulating layer on the wafer by the ions and wherein
10 the wafer is disposed in the relatively weak electrical field and wherein
an electrode providing the relatively weak field is spaced from, but
disposed relatively close to, the wafer to cooperate with the wafer in providing a high
impedance in the capacitor and a circuit including the capacitor for attracting the ions in
the weak electrical field to the wafer to etch the surface of the insulating layer on the
15 wafer without pitting the insulating layer.

29. (New) A method as set forth in claim 26 wherein
the capacitor constitutes a first capacitor and wherein
the first capacitor and a second capacitor are in series and wherein
20 the first capacitor is defined by plates constituting an electrode and the
wafer and in which the plates are separated by a space in which molecules and ions of the

inert gas are disposed to define the insulator for the capacitor and to provide the high impedance and wherein

the second capacitor is defined by plates constituting the wafer and the ions of the inert gas in the enclosure and wherein the plates are separated by the insulating

5 layer in the wafer to define the insulator of the second capacitors and to provide a relatively low impedance in comparison to the high impedance of the first capacitor and wherein

the relatively strong electrical field is provided by a first electrode and a first alternating voltage providing a relatively high negative bias on the first electrode and

10 wherein

the relatively weak electrical field is provided by a second electrode and by a second alternating voltage providing a relatively low bias on the second electrode.

30. (New) A method of etching an insulating layer on a wafer to present
15 a clean and fresh surface on the insulating layer for deposition, including the steps of
passing molecules of an inert gas through an enclosure,
disposing a first electrode in the enclosure to provide a strong electrical
field in a first direction at first positions in the enclosure to ionize molecules of the inert
gas in the enclosure,

disposing a second electrode in the enclosure to provide a weak electrical field at second positions in the enclosure in a second direction opposite to the first direction,

5 providing a magnetic field in the enclosure, in a direction transverse to the first and second directions, to cooperate with the strong electrical field in producing charged particles in the enclosure and to cooperate with the weak electrical field in producing a transfer of the charged particles to the surface of the insulating layer in the wafer to provide a weak and controlled etching of the surface of the insulating layer without producing pits in the surface of the insulating layer.

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31. (New) A method as set forth in claim 30 wherein the molecules of the inert gas pass through the enclosure from the strong electrical field to the weak electrical field and wherein the magnetic field is substantially perpendicular to the first and second electrical fields.

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32. (New) In a combination in claim 30 wherein the strong electrical field is defined in part by the first electrode and by an alternating voltage applied at a first magnitude to the first electrode to bias the first electrode at a negative DC potential with a first magnitude and wherein

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the weak electrical field is defined in part by the second electrode and by an alternating voltage applied to the second electrode at a second magnitude less than the first magnitude to bias the second electrode at a negative DC potential with a second magnitude less than the first magnitude for producing the transfer of the charged particles
5 to the surface of the wafer to provide the weak and controlled etching of the surface of the insulating layer without producing pits in the surface of the insulating layer.

33. (New) In a combination as set forth in claim 30 wherein
the magnetic field is provided by magnetic members and wherein
10 the magnetic members and the first and second electrodes define the enclosure.

34. (New) In a combination as set forth in claim 30 wherein
the wafer is disposed in the weak electrical field and is separated from the
15 second electrode in the weak electrical field.

35. (New) In a combination as set forth in claim 30 wherein
the magnetic field is substantially perpendicular to the strong and weak
electrical fields and wherein

the molecules of the inert gas pass into the enclosure through the strong magnetic field and the molecules and the ions of the inert gas pass from the enclosure through the weak electrical field.

5 36. (New) A method as set forth in claim 30 wherein
the second electrode and the wafer constitute plates of a first capacitor and ions and molecules of the inert gas constitute the dielectric of the first capacitor and wherein

the wafer and the ions of the inert gas constitutes plates of a second
10 capacitor and wherein the insulating layer of the wafer constitute the dielectric of the second capacitor and wherein

the first capacitor has a higher impedance than the second capacitor.

37. (New) A method of etching an insulating layer on a wafer having at
15 least one socket, defined by walls in the insulating layer, to present a clean and fresh surface on the insulating layer, including the walls of the socket, for deposition, including the steps of:

passing molecules of an inert gas through an enclosure,

providing a strong electrical field at first positions in the enclosure to ionize

20 molecules of the inert gas in the enclosure

providing a weak electrical field at second positions, including the positions of the wafer, in the enclosure, and

providing a magnetic field in the enclosure in a direction transverse to the directions of the first and second electrical fields in the enclosure to cooperate with the strong electrical field in producing charged particles and to cooperate with the weak electrical field in producing a transfer of the charged particles to the surface of the insulating layer in the wafer and the walls of the socket in the insulating layer at a low speed to provide a weak and controlled etching of a uniform thickness from the surface of the insulating layer and the walls of the socket without pitting the surface of the insulating layers or the walls of the socket.

38. (New) A method as set forth in claim 37, including the steps of:

providing a first electrode in the enclosure for the strong electrical field and introducing an alternating voltage of a first particular amplitude to the first electrode to produce a strong negative DC bias on the first electrode for the creation of the strong electrical field,

providing a second electrode in the enclosure for the weak electrical field and introducing an alternating voltage of a second particular amplitude less than the first particular amplitude to the second electrode to produce a weak negative DC bias on the second electrode for the creation of the weak electrical field.

39. (New) A method as set forth in claim 37, including the steps of:

disposing the wafer in the enclosure in a spaced relationship to the second electrode to provide a high impedance between the second electrode and the wafer for limiting the transfer of charged particles to the surface of the insulating layer and the walls of the socket and for providing for an elimination of a substantially uniform thickness from the surface of the insulating layer and from the surfaces of the walls of the socket.

40. (New) A method as set forth in claim 37, including the steps of:

providing a first electrode to create the strong electrical field,

providing a second electrode to create the weak electrical field,

providing magnets to create the magnetic field,

the first and second electrodes and the magnets substantially defining the enclosure, and

disposing the wafer in the enclosure in closely spaced relationship to the second electrode.

41. (New) A method as set forth in claim 37 wherein

the wafer is at a floating potential and wherein

the magnets are substantially at a ground potential and wherein

first and second members substantially at ground potential are provided respectively in proximity to the first and second electrodes to cooperate respectively with the first and second electrodes in creating the strong and weak electrical fields.

5 42. (New) A method as set forth in claim 37 including the steps of:

 introducing an alternating voltage of a first particular magnitude to the first electrode to produce a strong negative DC bias on the first electrode for the creation of the strong electrical field,

 introducing an alternating voltage of a second particular magnitude less
10 than the first particular magnitude to the second electrode to produce a weak negative bias on the second electrode for the creation of the weak electrical field, and

 providing a high impedance between the second electrode and the wafer and a low impedance between the wafer and the charged particles near the wafer to produce a transfer of charged particles with limited energy to the surface of the insulating
15 layer and the walls of the socket in the insulating layer and to provide the weak and controlled etching of the surface of the insulating layer and the walls of the socket with a uniform thickness of material from the insulating layer and the wall of the socket without pitting the surface of the insulating layer or the walls of the socket.